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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/467,253	12/20/1999	SAILESH CHITTIPEDDI	CHITTIPEDDI 59-108	2132

27964 7590 08/21/2003

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EXAMINER
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ESTRADA, MICHELLE

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 08/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/467,253

Applicant(s)

CHITTIPEDDI ET AL.

Examiner

Michelle Estrada

Art Unit

2823

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 May 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 and 21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

Applicant's arguments with respect to claims 1-15 and 21 filed 5/27/03 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 10 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Shih et al. (6,329,722).

Shih et al. disclose forming a bond pad made from an interconnect metal (310) on a semiconductor substrate (11); encapsulating said bond pad with a homogenous metal passivation layer (320); bonding a wire (330) onto the metal passivation layer, the metal passivation layer including a metal different from the wire; wherein a portion of the metal passivation layer forms an intermetallic bond with the interconnect metal (Col. 5, lines 20-24), and wherein another portion of the metal passivation layer forms a different intermetallic bond with the wire (Col. 5, lines 44-46); and wherein a mechanical and electrical connection is provided between the interconnect metal and the wire, with the metal passivation layer disposed there between; performing a heat treatment after the bonding step (Col. 5, lines 35-50).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-9, 11-13, 15 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shih et al. as applied to claims 10 and 14 above, and further in view of Costrini et al. (6,187,680) and Harper.

Shih et al. do not disclose that the interconnect material is copper; wherein the homogenous metal passivation layer is tantalum; patterning by pad masking, photoresist patterning or photolithography and etching the tantalum layer; wherein the wire is aluminum; and forming a tantalum aluminide compound; wherein the thickness of the Ta layer is between 300 to 1000 Å; wherein the aluminum wire is bonded onto the Ta layer by wedge bonding; packaging the substrate in a package consisting of a plastic package.

Costrini et al. disclose forming a bond pad made from an interconnect material 12 on a semiconductor substrate; encapsulating said bond pad with a passivation layer (Ta) 16 (Col. 5, line 5); patterning and etching the Ta layer using conventional lithography and then reactive ion etching (Col. 5, line 41); bonding a wire (gold or gold alloy) onto the passivation layer, wherein the wire is more metallurgically stable than the interconnect material; wherein a portion of the passivation layer forms a metallurgical bond with the interconnect material; and wherein a mechanical and electrical connection

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is provided between the interconnect material and the wire, with the passivation layer disposed there between (See fig. 1 and Col. 1, lines 42-67); wherein the substrate is a multi-layered interconnect structure; wherein the thickness of the Ta layer is between 300-800 Å (Col. 5, line 16), which overlaps the recited range. Costrini et al. discloses forming a semiconductor substrate 10 with a copper interconnect material 12 as described above, wherein the upper surface of 12 is encompassed by "copper bond pad"; wherein a portion of the Ta layer bonds with the Cu bond pad; packaging the substrate in a packaging consisting of a plastic package (Col. 5, lines 54-55).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Shih et al. and Costrini et al. to enable formation of the wire bonding and further to protect the copper wiring from environmental attack and/or reactions with the packaging materials.

The steps recited in claim 1 that a Ta layer forms a tantalum aluminide compound to bond with the aluminum wire, would be obtained because the same materials are treated in the same manner as in the instant invention.

The combination of Shih et al. and Costrini et al. does not disclose that the wire is made specifically from Al. However, applicant has not seasonably contested the taking of official notice in the office action mailed 5/13/02, thereby admitting that Al as a material for a wire was known prior to applicant's invention.


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Harper discloses that the oldest form of thermo compression bonding is wedge bonding. It would have been within the scope of one of ordinary skill in the art to combine the teachings of Shih et al., Costrini et al. and Harper to achieve the bonding step, and further provides additional alternatives of bonding methods.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is (703) 308-0729. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

  
George Fourson  
Primary Examiner  
Art Unit 2823

  
MEstrada  
August 4, 2003